

geophysikalischen Institutes," Frankfort on the Main, as soon as funds for publication are available. Only one result is to be given here.

10. *Relative values of sky radiation in the spectrum range of the sodium cell with the sun at the zenith.*—There are available four series of measurements which agree very well, so that the considerations previously mentioned do not hold for these relative values. The zone just at 30° altitude radiates least strongly. If we designate the value for this point by 100 then there appears the following distribution:

Altitude..... 5° 10° 15° 20° 25° 30° 35° 40° 45° 50° 55° 60° 65° 70° 75° 80°
 Sky radiation..... 114 112 108 104 101 100 102 106 109 113 119 128 144 230 312 *500

*Approximate.

NOTE.—This expedition was supported by the *Ministerio de agricultura, Republica Argentina*, the *Stinnes Steamship Lines*, and the *Verein der Freunde des Taunus-Observatoriums*, Frankfort on the Main.

THE PHYSICAL-METEOROLOGICAL OBSERVATORY AT DAVOS, SWITZERLAND

551.501 (494)

By Prof. Dr. C. DORNO, Director of the Observatory

For several years the MONTHLY WEATHER REVIEW has from time to time published contributions from the director of the above-mentioned observatory, and in its bibliography has referred to his works. Recently there has been organized in connection with the observatory a medical research institute (Institute for Alpine Physiology and Tuberculosis Research), which, in collaboration with the observatory, will investigate the influence of the climate in high altitudes on both the healthy and the sick. Through this collaboration an institute for research unique not only in Switzerland, but almost in the whole world has been created, which has for its object the combating of that most terrible scourge of mankind, tuberculosis. In this work it will utilize the rich clinical material which is frequenting the world-renowned health resort of Davos. The director of the medical institute is Professor Loewy, the collaborator for many years of Professor Zuntz and he is at the same time in charge of the physiological laboratory. The pathologic-bacteriological department, which will be entirely independent, is still being enlarged and will soon be completed.

From the founding of the observatory in 1907, its investigations have been directed principally to radiation studies. These have included the radiation of the sun, and of the sky, and of both combined, as to their total energy and as to the energy of restricted spectral regions; also reflected radiation, and nocturnal radiation. Starting from the climatic points of view with the merely statistical problem of the quantities or intensities of the different kinds of rays that reach the place of observation, and their variation in intensity with the hour of the day, the season of the year, and the weather, the observatory soon enlarged its series of problems towards geophysics, and automatically to almost all the problems of atmospheric optics. The contributions to the climatic questions on the whole are given in the monograph published in 1911 by Friedr. Vieweg & Son, Brunswick, entitled "Studies on light and air of the high mountains," and containing the constants of radiation of Davos together with several years' records of the atmospheric-electrical elements and radioactive values. The former have been amplified and perfected in the subsequent years after the introduction of the photo-electric method. The *Meteorologische Zeitschrift* and the *Physikalische Zeitschrift* have published reports thereon. The program adapted to the "studies," which has also been described and discussed in other publications, has been followed in the researches of the radiation climate of other places, such as Kolberg, St. Blasien, recently also Arosa, Agra (Tessin), and even to a certain extent in the United States of North America. Atmospheric optics has claimed and obtained rightful recognition in the voluminous works "Phenomena of twilight and corona around the sun" and "Himmelshell-

igkeit, Himmelspolarisation und Sonnenintensität in Davos, 1911 bis 1918" which appeared in 1917 and 1919 in the *Abhandlung des Preussischen Meteorologischen Institutes*, Vol. V and Vol. VI. The latter work aims at uniformly comprehending the whole economy of atmospheric light, that is to say, establishing what has become of the incident solar radiation, and what sort of changes it has undergone with regard to intensity, polarization, and color. The years from 1919 to 1921 have been devoted to the perfection of recording methods on the basis of the methods employed only for individual measurements in the foregoing years. These efforts arrived at an almost complete success, as has been shown in "Progress in radiation measurements" published in the MONTHLY WEATHER REVIEW in 1922, according to which Davos is the first place in the world to continuously record the total exchange of heat by radiation during the course of a whole year.

After such successful work the observatory, founded and maintained by the director's own means, would have been forced to close in consequence of the depreciation of his German properties, had not, it may be said, all Switzerland—the Swiss Association for Naturalistic Research, Swiss Society for Climatology and Balneology, Swiss Red Cross, canton and community authorities, Cantonal Medical Association and others—the subvention on the part of the Swiss Confederation is positively promised) undertaken to aid the observatory, and amplify it by a medical institute, as already described. Affiliated with the institute, but entirely free and independent with reference to its working methods, management, and name, as well as in its unaltered situation, the observatory exists independently by the side of the institute. Professor Dorno has been named an honorary member of the institute and member of the board. There is much to be hoped for in the future collaboration of meteorology, physics and physiology, more particularly as the place of observation, in the high mountains, is to be considered the most favorable for such combined investigations. Dorno's works published in the years 1922 and 1923, "About specific-medical climatology," "On the connection between the extension of the ultra-violet solar spectrum and the formation of pigment," and others, indicate the first directives to be followed by these works of collaboration, by the side of which the old aims of the observatory are being pursued in an unaltered manner.

About the foundation, organization, and the objects of the Institute of Physiology it may be briefly said: The board is composed of nine members, of whom five are to be medical men or naturalists. To the institute there is attached a scientific body giving advice and offering collaboration, being composed of professors of the Swiss universities, not only of medical men, but also representatives of the meteorological and physical faculty

of Zurich University. Scientific men proposed by the scientific council are in the first instance admitted to working places, and also other investigators of any nationality. A branch station is connected with the institute and the observatory well equipped and in the best imaginable situation at a height of 2,500 meters on Muottas-Muraigl near Samaden (Engadine), easily accessible by a funicular railway. The publications issued having their origin in researches supported by the funds of the institute will bear in their title a notice referring thereto. For the equipment of the institute so far 55,000 Swiss francs are available (wherein the value of the instruments of the observatory valued at 80,000 Swiss francs is not comprised), and the budgets of the first year amount to 57,000 Swiss francs.

On January 3 to 5, 1924, a belated modest inauguration took place, in which the Federal, cantonal, and communal authorities, representatives of the universities of Zurich, Basel, Bern, and of the scientific council composed of professors of the Swiss universities and of physicians, took an active part.

A METEOROLOGIST AT SEA

Dr. C. F. Brooks, associate professor of meteorology and climatology at Clark University, Worcester, Mass., recently made a voyage to the West Indies for the three-fold purpose of (1) observing winter weather and its effects on the people, (2) obtaining a series of comparative surface water temperature and weather observations, and (3) determining the best method of making sea surface temperature observations. A report of the investigation will appear in a subsequent issue of the *MONTHLY WEATHER REVIEW*.

During the last stage of the return voyage, when the vessel on which Doctor Brooks was a passenger, the *Empress of Britain*, was proceeding from Bermuda to New York, a storm of considerable proportions was encountered. Doctor Brooks has prepared the following account of this storm, which is of special interest as coming from a meteorologist rather than a seaman.—Ed.

SOME NOTES ON THE WEATHER, MARCH 21-23, 1924, BERMUDA TO NEW YORK

By C. F. BROOKS

The weather on the 21st at Bermuda was very rainy; heavy showers of rain occurred, especially at about 10 a. m. and 1 to 2 p. m. The first shower marked the

arrival of much warmer, moister air, and the second one came just before a very great increase in wind velocity, accompanying a shift in direction from SE. to SW. For about an hour around sunset the sky was clear. Then, however, low clouds formed as the wind shifted to WSW. A line of clouds marked with moderate to brisk showers passed over at about 8:40 p. m. at the time the wind shifted from WSW to W. Thereafter, the sky was partly cloudy with alto-cumulus and strato-cumulus, the wind increasing all the time. Shortly before midnight the sky was practically clear. During the night, however, there was more cloudiness and some showers. Shortly before 6 a. m., the 22d, there were ragged clouds at two or three levels, with patches of greenish blue sky here and there, and with a number of showers visible in different directions. The clouds thickened and at 8 presented a rather solid looking wall across the northwestern sky. At 8:40 the rain front of the main wind-shift line reached us, and three-quarters of an hour later the wind shifted suddenly from a fresh westerly gale to a fresh north-northeasterly one. The pressure began to rise rapidly from its low point of about 29.15 inches, maintained since 2 a. m. In the latter part of the morning the atmospheric pressure in my stateroom was varying up and down as much as 0.14 of an inch with the movement of the ship. This appears to have been a combination of the change in altitude with the passing waves, and also the relative compression in the ventilator as the ship rolled from side to side.

The sky remained continuously cloudy with strato-cumulus from which occasional showers fell till about noon when the sun began to shine now and then. During the early afternoon, though the strato-cumulus clouds looked very heavy, it was not possible to tell whether there were any light showers or not. There was an unceasing rain of salt spray over the ship all the time, with occasional falls of considerable masses of water. Later, as the temperature of the water rose, as we approached the center of the Gulf Stream, the sea became rougher and showers general. At the time of the highest water temperature (71) shortly after 6 p. m. the sea was roughest, the propellers of our ship coming out with practically every wave, and the cloud cover was denser and apparently more rainy. Immediately we passed from water at 71 into water of 54 at 7:30 p. m., however, the sea quieted considerably, and the sky partly cleared. The gale continued, however, for some hours more. Before sunrise the next morning the weather was clear and quiet, though there was still a moderate ground swell to give us a suggestion of the storm we had just run out of.

THE MOVEMENT OF THE CYCLONE OF MARCH 8, 1924, ACROSS TEXAS

551.515 (764)

ALFRED J. HENRY, Meteorologist

[Weather Bureau, Washington, April 17, 1924]

The type of pressure distribution shown in Figure 1 is one of particular interest to forecasters of the United States Weather Bureau; interesting because there is often a distinct hiatus in the path of cyclones that pass from the high plateau of New Mexico to the plains of Texas, and consequently a certain degree of uncertainty as to their future course and development.

It is a rather remarkable fact that extratropical cyclones in winter occasionally advance from the Pacific about north latitude 45° to 50° southeastward directly to Texas or the lower Mississippi Valley without apparently losing any kinetic energy. The rapidity of movement leads to the inference that friction with the exceed-

ingly rugged topography of the path followed is absent and further that the bottom portion of the whirl is cut off as it crosses the mountains. In some way not clearly understood, the middle and top parts of the whirl conserve their original energy until they arrive in the region where warm moist currents are found in the levels next to the surface. So soon as that region is reached connection with the surface is again completed and the storm pursues its normal course with unabated energy.

In this particular case (see fig. 1') the level of the barometer in the center of the cyclone is rather low and

1 For the path of the cyclone here illustrated see track No. IV of chart 11, this REVIEW.